

# 6502 Instructions

Name and Description	Addressing Modes	Op-Codes	Status	N	Z	C	I	D	V
<b>ADC</b> Add memory to accumulator with carry	ADC #Imm ADC ZP ADC ZP,X ADC Abs ADC Abs,X ADC Abs,Y ADC (ZP,X) ADC (ZP),Y	69- 65- 75- 6D- 7D- 79- 61- 71-	• • - - -						
<b>AND</b> "AND" memory with accumulator	AND #Imm AND ZP AND ZP,X AND Abs AND Abs,X AND Abs,Y AND (ZP,X) AND (ZP),Y	29- 25- 35- 2D- 3D- 39- 21- 31-	• • - - -						
<b>ASL</b> Shift left one bit (Memory or Accumulator)	ASL A ASL ZP ASL ZP,X ASL Abs ASL Abs,X	0A- 06- 16- 0E- 1E-	• • • - -						
<b>BCC</b> Branch on carry clear	BCC Rel	90-	- - - - -						
<b>BCS</b> Branch on carry set	BCS Rel	B0-	- - - - -						
<b>BEQ</b> Branch on result zero	BEQ Rel	F0-	- - - - -						
<b>BIT</b> Test bits in memory with accumulator	BIT ZP BIT Abs	24- 2C-	• • - - -						
<b>BMI</b> Branch on result minus	BMI Rel	30-	- - - - -						
<b>BNE</b> Branch on result not zero	BNE Rel	D0-	- - - - -						
<b>BPL</b> Branch on result plus	BPL Rel	10-	- - - - -						
<b>BRK</b> Force break	BRK	00	- - - 1 -						
<b>BVC</b> Branch on overflow clear	BVC Rel	50-	- - - - -						
<b>BVS</b> Branch on overflow set	BVS Rel	70-	- - - - -						
<b>CLC</b> Clear carry flag	CLC	18	- - 0 - -						
<b>CLD</b> Clear decimal mode	CLD	D8	- - - 0 -						
<b>CLI</b> Clear interrupt disable status	CLI	58	- - - 0 -						
<b>CLV</b> Clear overflow flag	CLV	B8	- - - - 0						
<b>CMP</b> Compare memory and accumulator	CMP #Imm CMP ZP CMP ZP,X CMP Abs CMP Abs,X CMP Abs,Y CMP (ZP,X) CMP (ZP),Y	C9- C5- D5- CD- DD- D9- C1- D1-	• • - - -						
<b>CPX</b> Compare memory and index X	CPX #Imm CPX ZP CPX Abs	E0- E4- EC-	• • • - -						
<b>CPY</b> Compare memory and index Y	CPY #Imm CPY ZP CPY Abs	C0- C4- CC-	• • - - -						
<b>DEC</b> Decrement memory by one	DEC ZP DEC ZP,X DEC Abs DEC Abs,X	C6- D6- CE- DE-	• • - - -						
<b>DEX</b> Decrement index X by one	DEX	CA	• • - - -						
<b>DEY</b> Decrement index Y by one	DEY	88	• • - - -						
<b>EOR</b> "Exclusive-Or" memory with accumulator	EOR #Imm EOR ZP EOR ZP,X EOR Abs EOR Abs,X EOR Abs,Y EOR (ZP,X) EOR (ZP),Y	49- 45- 55- 4D- 5D- 59- 41- 51-	• • - - -						

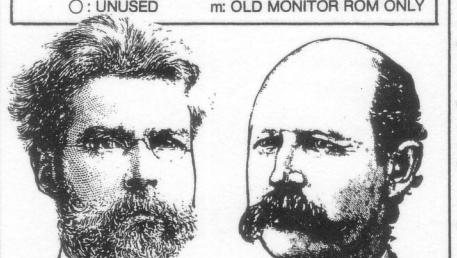
ABBREVIATIONS		STATUS REGISTER	
#Imm	Immediate Value	•	May change
ZP	Zero Page Address	-	No change
Abs	Absolute Address	0	Changes to 0
Rel	Relative Address	1	Changes to 1
( )	Indirect Address		
A	Accumulator		
X	Index Register X		
Y	Index Register Y		

The dashes following the Op-Code indicate the total length of the instruction—2 dashes in a 3 byte instruction, 1 in a 2-byte instruction, and none in a 1-byte instruction.

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Name and Description	Addressing Modes	Op-Codes	Status	N	Z	C	I	D	V
<b>NOP</b> No operation	NOP	EA	- - - - -						
<b>ORA</b> "OR" memory with accumulator	ORA #Imm ORA ZP ORA ZP,X ORA Abs ORA Abs,X ORA Abs,Y ORA (ZP,X) ORA (ZP),Y	09- 05- 15- 0D- 1D- 19- 01- 11-	• • - - -						
<b>PHA</b> Push accumulator on stack	PHA	48	- - - - -						
<b>PHP</b> Push processor status on stack	PHP	08	- - - - -						
<b>PLA</b> Pull accumulator from stack	PLA	68	• • - - -						
<b>PLP</b> Pull processor status from stack	PLP	28	• • • • •						
<b>ROL</b> Rotate one bit left (memory or accumulator)	ROL A ROL ZP ROL ZP,X ROL Abs ROL Abs,X	2A- 26- 36- 2E- 3E-	• • - - -						
<b>ROR</b> Rotate one bit right (memory or accumulator)	ROR A ROR ZP ROR ZP,X ROR Abs ROR Abs,X	6A- 66- 76- 6E- 7E-	• • • - -						
<b>RTI</b> Return from interrupt	RTI	40	• • • • •						
<b>RTS</b> Return from subroutine	RTS	60	- - - - -						
<b>SBC</b> Subtract memory from accumulator with borrow	SBC #Imm SBC ZP SBC ZP,X SBC Abs SBC Abs,X SBC Abs,Y SBC (ZP,X) SBC (ZP),Y	E9- E5- F5- ED- FD- F9- E1- F1-	• • • - -						
<b>SEC</b> Set carry flag	SEC	38	- - 1 - -						
<b>SED</b> Set decimal mode	SED	F8	- - - 1 -						
<b>SEI</b> Set interrupt disable status	SEI	78	- - - 1 -						
<b>STA</b> Store accumulator in memory	STA ZP STA ZP,X STA Abs STA Abs,X STA Abs,Y STA (ZP,X) STA (ZP),Y	85- 95- 8D- 9D- 99- 81- 91-	- - - - -						
<b>STX</b> Store index X in memory	STX ZP STX ZP,Y STX Abs	86- 96- 8E-	- - - - -						
<b>STY</b> Store index Y in memory	STY ZP STY ZP,X STY Abs	84- 94- 8C-	- - - - -						
<b>TAX</b> Transfer accumulator to index X	TAX	AA	• • - - -						
<b>TAY</b> Transfer accumulator to index Y	TAY	A8	• • - - -						
<b>TSX</b> Transfer stack pointer to index X	TSX	BA	• • - - -						
<b>TXA</b> Transfer index X to accumulator	TXA	8A	• • - - -						
<b>TXS</b> Transfer index X to stack pointer	TXS	9A	- - - - -						
<b>TYA</b> Transfer index Y to accumulator	TYA	98	• • - - -						

APPLE ZERO-PAGE USAGE																
Dec:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Hex:	\$0	\$1	\$2	\$3	\$4	\$5	\$6	\$7	\$8	\$9	\$A	\$B	\$C	\$D	\$E	\$F
0 \$00	A	M	A	A	A	A	O	O	O	A	A	A	A	A	A	M <sup>2</sup>
16 \$10	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
32 \$20	M	M	M	M	M	M	D	D	D	M	M	M	D	M	D	M
48 \$30	M	M	M	D	M	D	M	D	M	D	M	D	M	D	M	M
64 \$40	D	M	D	M	D	M	D	M	D	M	D	D	D	M	D	M
80 \$50	A	M	A	M	A	M	A	M	A	A	A	A	A	A	A	A
96 \$60	A	A	A	A	A	A	AD	AD	AD	A	A	A	A	A	A	AD
112 \$70	A	A	A	A	AD	A	AD	A	A	A	A	A	A	A	A	A
128 \$80	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
144 \$90	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
160 \$A0	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
176 \$B0	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	AD
192 \$C0	A	A	A	A	A	A	A	A	A	AD	AD	AD	AD	AD	AD	O
208 \$D0	A	A	A	A	A	A	AD	O	AD	O						
224 \$E0	A	A	A	A	O	A	A	A	A	O	O	O	O	O	O	O
240 \$F0	A	A	A	A	A	A	A	A	A	O	O	O	O	O	O	O
A: APPLESOFT D: DOS O: UNUSED																
M: MONITOR M: Ile MONITOR ONLY M: OLD MONITOR ROM ONLY																



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